6.—The Physiography, Vegetation and Vertebrate Fauna of North Island, Houtman Abrolhos

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Manuscript received—16th February 1960

Introduction

North Island (28° 18′ S, 113° 35′ E), the most northern of the Houtman Abrolhos, was named by the officers of H.M.S. 'Beagle', who charted the adjacent seas towards the end of May, 1840. It is 11 miles distant to the NNW. from its nearest neighbours, the Wallabi Islands, which it more nearly resembles in size, shape and elevation than the low narrow islands of the Easter and Pelsart Groups. But probably owing to its remoteness, North Island has never been regarded geographically as one of the Wallabi Group.

Only four parties of naturalists have investigated North Island. The first was the visit of the 'Beagle', already referred to; its narrative was published by Commander J. L. Stokes (1846).

The Percy Sladen Trust Expedition, led by Prof. W. J. Dakin, spent a few days on the island in November, 1913. Dakin (1919) described, *inter alia*, the physiography of the island, and Alexander (1922) enumerated the vertebrates collected by the expedition.

North Island was next visited by Dr. D. L. Serventy on December 6, 1945. He did not publish an account of the trip, but his manuscript notes were made available to the writer.

Finally the island was examined from September 6-8, 1959, by a party from the Zoology Department of the University of Western Australia, comprising D. H. Edward, A. R. Main, H. Waring and the writer. We were accompanied by visiting English botanist, Dr. Mary E. Gillham. Our purpose was to study the vegetation (hitherto undescribed) and to collect or record the terrestrial fauna. This visit was made during an expedition to the Wallabi Islands to collect live wallabies for the Department's research program on the physiological ecology of marsupials.

Physiography

North Island is roughly oval in shape, has a maximum length of 1¼ miles and an approximate area of 450 acres. It consists of a low central plain surrounded by dunes of calcareous sand, the highest of which attain an elevation of 50 feet.

The limestone basement of the island seldom exceeds 5 feet above present sea-level, so that it outcrops on the central plain in only a few small areas. Other exposures are equally restricted, viz. the low cliffs around South Point, the seaward toe of Record Hill and the walls of the sink-hole in the extreme south-western corner of the plain. It is the absence of extensive coralline limestone surfaces that is responsible for most of the differences in physiognomy and vegetation between North and the Wallabi Islands.

At present the highest dunes are Record Hill and Northwest Hill, both on the western side of the island. In 1913 Dakin considered the eastern dunes higher than the western. Since then, the eastern dunes have been severely blown out, their few remnants today being no higher than 20 feet. To ascertain the cause of this erosion, a questionnaire was circulated among Geraldton fishermen.

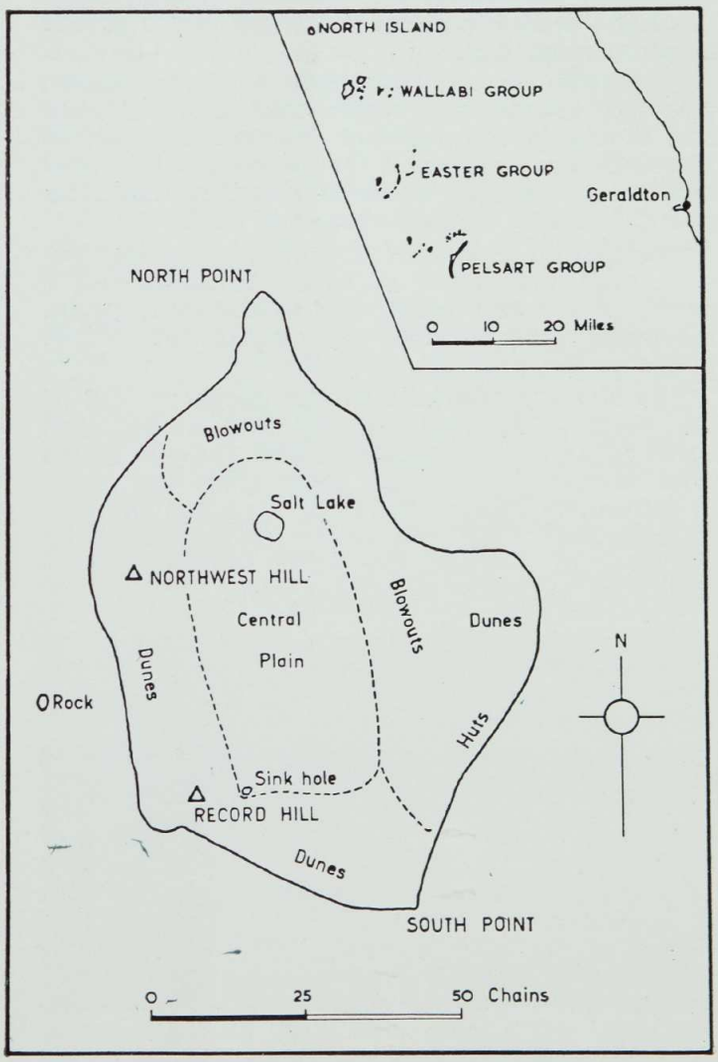

Fig. 1.—Map of North Island.

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Messrs. A. Bertelsen and H. Akerstrom inform me that the vegetation which had hitherto covered the eastern dunes was destroyed by fire in October 1935, after which the sand began to drift. Denudation was apparently slow for many years, for in 1945 Serventy referred to erosion only in the south-eastern corner of the island. Soon after, however, another fire devastated this sector. According to Mr. G. C. Barker, the movement of sand accelerated about 1950, reaching a peak two years later. On his return to the island in February, 1952, he found the low scrub behind North Point engulfed in sand blown from the dunes to the south-east. Previously the far northern end of the island had been densely vegetated.

At present the blown-out areas show no sign of regeneration. The few remaining clumps of *Spinifex longifolius*, perched precariously on pinnacles of sand up to 8 feet high, are quite incapable of spreading. In view of the meagre rainfall and the persistence of strong southerlies in summer, it seems unlikely that this cycle of erosion will be arrested before the eastern and northern dunes are completely levelled.

Our outline of the island (Fig. 1) shows some minor discrepancies with that depicted on Admiralty Chart 1723. If these are in fact indicative of subsequent changes in the coastline, it would appear that North Point has grown since the original survey by the 'Beagle' and that a high-level beach has been formed by the filling in of the shallows along the south shore of the north-eastern bay.

In section the central plain is like a saucer. The soil around the higher rim is fairly deep and is largely composed of fragments of shells. Towards the centre it becomes shallow and loamy. In certain areas the soil is distinctly guano-like and contains bones of birds.

The sink-hole is a circular, steep-sided depression, with a diameter of about 10 yards and a depth of 3-4 feet below the surrounding plain. Its muddy floor was damp but contained no free water at the time of our visit.

The shallow salt-lake at the northern end of the plain is roughly circular and almost two acres in area. Its northern and eastern banks slope steeply for 2-3 feet down from the plain. It contained water during our visit but was dry in November, 1913. As its level is unaffected by the state of the tide, the water is probably replenished annually by winter rain.

Fig. 2.—From eastern dunes, looking south over a big blowout. Fishermen's huts in left middle distance.

Vegetation

The strand vegetation is dominated by *Spinifex longifolius* R. Br., *Salsola kali* Linn., *Atriplex cinerea* Poir and *Cakile maritima* Scop. Where backed by stable dunes the *Spinifex* soon gives way to *Atriplex paludosa* R. Br., *Scaevola crassifolia* Labill., *Olearia axillaris* (D.C.) F. Muell., *Myoporum insulare* R. Br. and *Exocarpus spartea* R. Br. Where the dunes are unstable, *Spinifex* extends inland, but the bare floor of blowouts is colonised only by *Cakile*, though sparsely and quite ineffectively. In the lee of the big eastern blowouts *Nitraria schoberi* Linn. grows luxuriantly along with dense clumps of *Salsola* and *Myoporum*. Towards South Point where the sand is shallow over the limestone, the following calciphilous shrubs appear: *Pimelea microcephala* R. Br., *Spyridium globulosum* (Labill.) Benth. and *Acanthocarpus preissii* Lehm.

Fig. 3.—From northern dunes, looking southwest over central plain to Northwest Hill. *Atriplex paludosa* and *Scaevola crassifolia* in foreground.

The vegetation of the central plain varies with the nature and depth of the soil. Deep shelly soils around the rim support a low dense shrubbery of *Rhagodia baccata* Moq., *Atriplex paludosa* and *Threlkeldia diffusa* R. Br. At lower levels and with increasing clay content, the following species become dominant: *Frankenia pauciflora* D.C., *Limonium salicornaceum* F. Muell. and *Arthrocnemum arbuscula* (R. Br.) Moq., the last-named being replaced by *A. halocnemoides* Nees wherever limestone approaches the surface. The low-lying clayey soils south of the salt-lake are water-logged in winter; they carry a dense mat of *Salicornia blackiana* Ulbrich, *Sporobolus virginicus* (Linn.) Kunth. and *Suaeda australis* (R. Br.) Moq., the only closed community on the island.

Much of North Island is thus dominated by low chenopodiaceous shrubs. Apart from a few big bushes of *Nitraria*, the vegetation is everywhere below five, and for the greater part, below three feet high. The aspect of the vegetation varies seasonally. At the time of our visit winter annuals were very much in evidence. On the central plain in particular, the ground between shrubs was carpeted with herbage, among which grasses and composites were especially conspicuous.

Reptiles

Chelonia mydas (Linnaeus).—In December 1945, Serventy observed about a hundred Green Turtles in the north-eastern bay close to the

shore. He and his companions searched the beaches but found no egg-mounds. However, A. Bertelsen informs me that "in December and January, hundreds of turtles come to the north side of the island to lay their eggs". North Island would be the southernmost breeding station of the species in Western Australia. Whether they still breed there is unknown, but we found on the north-western beach the remains of a turtle whose carapace was about three feet long.

Python spilotes (Lacépède).—No living Carpet Snake has ever been observed on North Island by naturalists. Yet there is no doubt that they occur here or did so until recently. Three of my informants (Geraldton fishermen) have seen them, including G. C. Barker who has lived on North Island only since 1945; however, he believes their numbers to be "very few". We found an intact backbone of *Python* with numerous petrel remains on the floor of a blowout in the north-western sector of the island.

Heteronota bynoei Gray.—Nine specimens of this gecko, including a very young animal, were collected from under slabs of limestone on the central plain.

Phyllodactylus marmoratus (Gray).—Four specimens of this gecko were obtained from the same locality as the preceding species.

Amphibolurus barbatus (Cuvier).—Alexander found Jew Lizards "plentiful" in 1913; Serventy "saw a few" in 1945; and subsequently G. C. Barker has observed them. Our party found none during three days work all over the island.

Egernia kingii (Gray).—We saw few King Skinks and collected only one, a juvenile from beneath a slab of limestone.

Lygosoma (Sphenomorphus) lesueurii Duméril and Bibron.—Several were seen in the coastal *Spinifex,* but we were unable to catch them. Two mummified specimens were found that matched in all essentials with a series from West Wallabi Island. Another and smaller skink, possibly *Ablepharus lineo-ocellatus,* occurred in the *Spinifex* but likewise evaded capture.

Lygosoma (Rhodona) praepeditum Boulenger.—Two specimens of this small worm-like skink were found with geckoes under slabs of limestone.

Birds

The following list is restricted to land-birds. Marine and littoral species will be discussed elsewhere.

Turnix varia (Latham).—In 1840 Stokes found the central plain "covered with coarse grass, where a great many quails were flushed." Both Alexander and Serventy described the Painted Quail as "common". We found no trace of the species, which presumably became extinct some time after 1945.

Phaps elegans (Temminck).—Serventy failed to see the Brush Bronzewing in 1945; nor have we or any of our informants observed it. If Alexander was not in error when he recorded the species for North Island, it must have become extinct soon after his visit.

Falco cenchroides Vigors & Horsfield.—A single kestrel was seen by Alexander, who supposed that it was a visitor from the mainland.

Hirundo neoxena Gould.—At the time of our visit there were at least 20 Welcome Swallows on the island, mostly in the vicinity of the fishermen's huts. A nest under an eave contained yellow-gaped fledglings that were able to fly. Serventy did not observe this species. As the island entirely lacks natural nest-sites (cavernous limestone and undercut cliffs) swallows have probably become established only since the erection of the huts (according to G. C. Barker who built the first one in 1946, there were four by 1950; at present there are thirteen).

Cinclorhamphus cruralis (Vigors & Horsfield).—At least three singing males of the Brown Songlark were observed on the central plain.

Zosterops gouldi Bonaparte.—Silvereyes were largely confined to the few places, such as the leeward slopes of the eastern dunes, where the shrubbery (*Nitraria* and *Myoporum*) was relatively tall and dense.

Anthus novae-seelandiae (Gmelin).—Pipits were surprisingly more plentiful on beaches and in dunes than on the central plain. Since Serventy observed a few birds, and Alexander a pair, the species is probably resident, rather than a visitor from the mainland as suggested by Alexander.

Mammals

Macropus eugenii (Desmarest).—Since previous visitors had never recorded this species—Stokes (1846, pp. 162-4) being explicit as to its absence—our discovery of numerous Tammar remains was entirely unexpected. The bones, almost wholly mandibles, were only found in the bottom of blowouts, usually associated on the east side of the island with rabbit skulls, and on the north-west with petrel bones. They probably owed their preservation to the dry climate and the calcareous nature of the sand that had covered them.

In answer to my question, what do you know of wallabies on North Island, A. Bertelsen replied, "have seen wallabies there in 1928 to 1930, only one or two and much larger than on East or West Wallabies". F. C. Burton wrote, "Extinct. Put there by fishermen in the early days of fishing". My other informants had no knowledge of wallabies on the island.

Whether these remains are those of a long extinct natural population or of a recent introduction, can only be decided after carbon-dating of the bones. Meanwhile the first alternative seems more likely; for the fact that the skulls of most of the tammars had been lost indicates that the population was not contemporary with the rabbits, whose skulls have been preserved in great abundance.

Neophoca cinerea (Péron & Lesueur).—Seals have been seen on North Island by A. Bertelsen ("several times in January") and G. C. Barker ("a few").

Oryctolagus cuniculus (Linnaeus).—Eight rabbits, trapped at Geraldton, were released by A. Bertelsen in 1934. The introduction was successful, Serventy finding them "exceedingly numerous" eleven years later. G. C. Barker writes, "In 1945 there were quite a few. We had a few traps and often had a rabbit. It was usual when we arrived in February to see a

dozen or so around the camp at daylight. A walk across to the west side would show 20 or 30 rabbits. They did not appear to burrow but lived under bushes, and as their only enemy was the sea-eagle they continued to live that way. They now appear to be extinct. This year and last I did not notice any, and it would appear the two cats which have gone wild and live in the centre of the island have cleared them out.".

Discussion

In the not very distant past North Island more nearly approached the Wallabi Islands in richness of fauna. Today its fauna can only be classed as depauperate. The dismal history of recent extinction may be divided into four periods.

(1) Before 1840.—Petrels, probably *Puffinus pacificus*, ceased for unknown reasons to breed on the island, despite its apparent ecological adequacy. It is also probable that a population of the wallaby, *Macropus eugenii* became extinct in this period, a period that is completely undocumented.

(2) 1840-1913.—Unfortunately Stokes' account is so brief that no decision can be made whether any animals became extinct in this period. No naturalists and apparently few fishermen visited the island in the 73-year period between the visit of the 'Beagle' and the Percy Sladen Trust Expedition.

(3) 1913-1945.—Between the two World Wars deep-sea fishermen from Geraldton were increasingly using the island as a haven in rough weather. As the island entirely lacks potable water and other resources useful to fishermen, landings were infrequent and unexploitary. To provide themselves with an emergency source of food, fishermen released on the island, wallabies and rabbits, only the latter becoming established. Early in the period the Brush Bronzewing seems to have become extinct. Fires in this period began the process of denudation that culminated in the next.

(4) After 1945.—The post-war establishment of the crayfishing industry has introduced new factors. The island is now inhabited by about 40 people for several months each year. Domestic cats have become feral, though there is no evidence that they breed. With man, there are now two efficient predators, more or less permanently living on the island.

Faunal impoverishment, movement of sand, and loss of vegetation have all accelerated in this period. The following species have either become extinct since 1945 or nearly so: Carpet Snake, Jew Lizard, Painted Quail and European Rabbit. While the disappearance of the rabbit is not regretted, it does illustrate how easily even a tenacious and abundant animal may be exterminated on a relatively small island. The recent establishment of a widespread species of swallow on North Island is little consolation for the loss of the other species.

Acknowledgments

The Director of Fisheries (Mr. A. J. Fraser) generously placed at our disposal free ship transport from Geraldton to the islands. Thanks are also expressed to those fishermen who gave information recounted in the text; to Dr. D. L. Serventy for the use of unpublished data; and to Mr. R. D. Royce for identifying our plant specimens.

The expedition was financed partly by a W.A. University Research Grant but chiefly by a generous grant from C.S.I.R.O. to Professor H. Waring for marsupial work.

I am indebted to Dr. Main, my supervisor, for overall direction and for reading the manuscript.

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